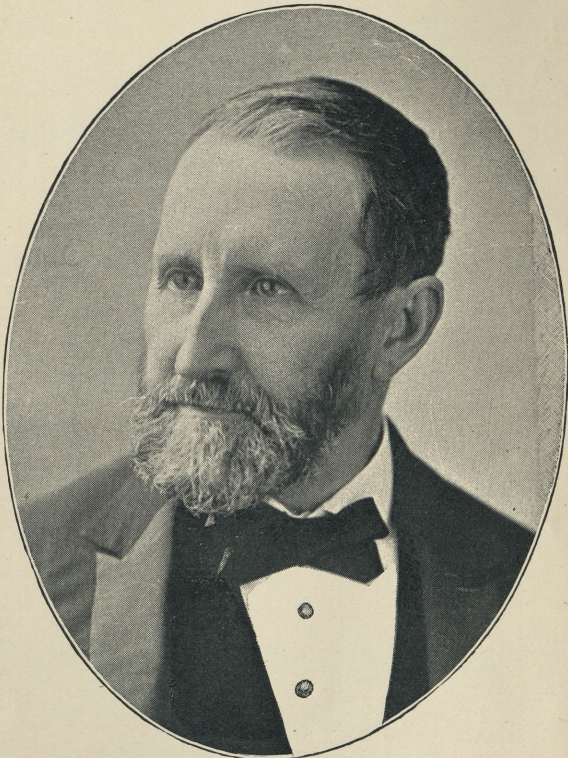

Yours truly

I. C. Johnson

President of the North Kent Amateur Photographic Society, Gravesend.

Born, Jan. 28th, 1811.

PHOTOGRAPHY OF TO-DAY CONTRASTED WITH THAT OF FORTY YEARS AGO.

On the 3rd of November, 1893, a public meeting was held in Gravesend, on the occasion of inaugurating New Rooms for the use of the North Kent Amateur Photographic Society, presided over by the Mayor of the borough, G. M. ARNOLD, Esq., D.L., A.K.C.C., on which occasion the President of the Society, I. C. JOHNSON, Esq., J.P., delivered the following lecture, entitled :—

"*Photography of the Present Day Contrasted with that of Forty Years Ago.*"

The Honorary Secretary, G. W. Cobham, Esq., P.A.S.I., gave a brief history of the Society, read a programme of the future proceedings, and terms of membership, and exhorted young men of the town to join the Society, promising pleasure to those who might be disposed to engage in the fascinating pastime. The Secretary then took a portrait of the Mayor by a magnesian flash light. After these preliminaries the Mayor called on the President to commence his lecture. Mr. JOHNSON, on rising, then said: As the President of this Society, I am requested by the Secretary and Members to say something about the fascinating amusement in which we are engaged. The title of my lecture is :—

PHOTOGRAPHY OF TO-DAY CONTRASTED WITH THAT OF FORTY YEARS AGO.

WHAT IS PHOTOGRAPHY?

THE popular idea is that it is the art of making pictures on paper, glass, or on any other surface by the agency of light. So named it appears from two Greek words, Phos light, and grapho, I write. Now this name, "photography," although not absolutely correct, answers the purpose very well, and although I object to it, in the course of my remarks I shall make use of it because it is popular. The name matters little so long as we know what is intended by it, "A rose by any name would smell as sweet." Expressions are often used that do not agree with the facts of the case in question. We speak of the rising and setting of the sun. This would convey the idea, that the sun actually arose in the East, crossed over the earth and descended in the West. No educated person is deceived by the expressions rising and setting, because such know perfectly, as well as do astronomers, that the phenomenon is caused by the revolution of the earth on its axis. So with the name photography. It conveys the idea that light is the agent that acts on the prepared plates or papers. It is true pictures cannot be made in darkness, nevertheless it is something other than light that does produce them; of this I hope to convince you as I proceed.

It is not known exactly who was the discoverer of the art of photography. The thing itself must have been presented to the eyes of the inhabitants of our world in ages past. A picture or a mirror hanging against a wall for some long time, would screen that part of it from the sun's rays that would enter through the windows. On removing the picture, it would be seen that the part of the wall behind it was different in colour from the surrounding parts. Now this is what is denominated photography,

people would say that the paper or paint had faded, but why had it not faded where the picture hung? Simply because the picture prevented the rays of the sun from acting upon the wall in that part. Now this is photography, and is exactly the case with our prepared plates or papers. For all the time they are kept in darkness, no chemical action can take place, but so soon as a ray comes in contact with a prepared plate, a chemical change is instantly produced. Although the fact must have been noticed by our forefathers in the more remote periods it does not appear that anyone sought to trace the effect to its cause, but this was, in reality, photography.

When the alchemists of old were endeavouring to find the philosophers' stone, that would convert the baser metals into gold, although the pursuit was vain, and one that no modern scientist would engage in, yet they discovered many things that are useful to mankind, and they found that "horn silver," or what we now know to be chloride of silver, would become black if exposed to the rays of the sun. It was not, however, until two French scientific men, Messrs. Niepce and Daguerre, turned their attention to the subject, that any serious steps were taken to make use of that circumstance for practical purposes, they made use of light, as they thought, to produce pictures.

But what is light? A question more easily asked, perhaps, than answered. There are, however, two chief theories with regard to it. First the emissive, second the undulatory; the former is that luminous bodies emit in all directions, an imponderable substance propagated in straight lines, and travelling at an immense velocity, 192,000 miles per second. The latter is that the particles of luminous bodies are animated by a vibratory motion, communicated to a subtle and elastic fluid, diffused throughout the universe and called ether.

The sun is the sole source of light, whether natural or artificial. It is not difficult to conceive that the sun is the

source of daylight, or even moonlight, as the latter reflects that of the former, but how the sun can be the source of candle-light, gas-light, &c., it is not so easy to understand.

It was the late George Stephenson, the father of railways, that suggested that coals in the mines were nothing else than "bottled sunshine." I was present when the British Association held its meeting at Newcastle-on-Tyne, and Sir William, now Lord Armstrong, supported Stephenson's theory, by stating that the primeval forests owed their existence to the sun as the life of vegetation. These forests being submerged by the agency of terrestrial convulsions; by the subterranean heat and pressure they became carbonized, and converted into what we now know as coal, or as the French call it, "carbon de terre;" that this is so, one only need visit the Museum at Newcastle-on-Tyne, where may be seen an almost complete tree of real coal, retaining its original shape of trunk and branches. Coal being the source of gas, together with other hydro-carbons, serve as artificial light, and owe their existence to the sun.

A ray of white light proceeding from the sun is not simple, but compound; were it not so there would be no such thing as colour in the world. Our sense of vision would never be gratified by the varied tints of the rose, the scarlet of the geranium, nor with the modest blue of the violet. All matter would be either white or black, or of the intermediate shades between the two extremes. That a ray of white light is decomposable can be proved by a simple experiment. If this room were completely dark, and the sun were shining brightly outside against this wall, and we were to make a small hole in the wall, a ray of bright light would stream through it.

Here is a triangular bar of glass, called a prism. If I were to place this prism in a proper position, so that the beam of light should impinge on it, that beam would be refracted, not as a simple one, as it entered, but into a number of rays. If we were to place an easel, covered with

paper, so as to intercept those rays, a very beautiful result would be observed; there would be formed what is called a solar spectrum, or seven coloured spaces, violet, indigo, blue, yellow, orange, and red. As we cannot here produce the actual spectrum from the sun itself, I have made this diagram. There is the solar beam touching the side of the prism; you see it is refracted, each ray having its own peculiar angle of refrangibility. The greatest angle is the violet; the smallest the red; all the intermediate colours having their own angles. These rays, however, are all simple—that is, they cannot be again decomposed, for if they be passed again through a prism, they each remain as they were. It is seen that a beam of light coming from the sun is not simple, but is composed of a bundle of rays, more indeed than those producing the spectrum. Allow me to call your attention more particularly to four of these rays: the *calorific*, the *luminous*, the *magnetic*, and the *chemical*. Now it is evident there is a difference in the properties of these various rays. Take the calorific, or heat-giving ray, how shall we find it? Here is the diagram again. You see how the rays spread out like a fan; that at the top is the violet, that at the bottom of the spectrum is the red. Here is a chemical thermometer. I hold the bulb of it against the violet colour. Of course there can be no effect here, because it is only a representation of the solar spectrum, and if it were a real one there would not be much more effect; but if I gradually lower the bulb, and hold it against the indigo, blue, yellow, not much more effect is produced; but when it is held in the red part of the real spectrum, the mercury will rise rapidly several degrees showing that the heating properties of sunshine reside principally in the red or calorific ray.

It is a remarkable, but a useful fact, that the effect of these individual rays may be stopped out, allowing others to pass onward. If a transparent plate of alum be interposed in a ray of white light, all other rays can pass through the alum medium, but the *calorific* cannot pass

through, proved by holding a thermometer on the outside of the alum, when the mercury will rise by expansion, but on the inner side the thermometer will not be affected. If the properties of the ray acting chemically could not be so sifted out, there would be no such thing as photography.

Now let us notice the luminous ray. The yellow is evidently the most light giving ray. On examining the solar spectrum, it is seen that the brightest part is that occupied by the yellow, and that the light diminishes rapidly on either side. Rooms glazed with yellow glass always appear abundantly illuminated, whilst the affect of blue glass is dark and sombre. The yellow colour, therefore, constitutes that portion of white light by which surrounding objects are rendered visible ; it is essentially the *visual* ray.

The magnetic ray. It is said that there is a connection between the sun's rays and magnetism—that is to say, there is a power therein to render a steel needle magnetic. Mrs. Somerville, who was a very scientific lady, has the credit for making this discovery. She had an idea that there existed such a connection, so balanced a needle on a point, and exposed it for a certain time to the action of the solar orb, and to her intense delight found that it had really become magnetic, possessing the power to attract other needles to itself.

But that ray which is of the greatest importance to the subject we have in hand, is what is termed the chemical ray, which has the property of acting upon organic salts of silver. Look again at the diagram of the solar spectrum. You see that the violet ray has a wide angle of refrangibility, and is at the top of the spectrum. It was seen that the calorific ray is at the bottom, having a less amount of refrangibility, and is red. As the red has an influence on a thermometer, so the violet affects sensitive paper. Again, supposing we had the real spectrum, instead of a drawing of it, and were to take a piece of any of the sensitized papers prepared with silver salts, place on the red

part of the spectrum, no effect would take place; the same if placed on the orange part; but if the same piece of paper be placed on the blue, the indigo, or on the violet, it would very soon change colour, because in those rays, but more especially in the violet, there reside a property called actinism, from "actis," a ray or flash that, acting chemically on the silver salts with which the paper is sensitized, produces a manifest change. It is abundantly evident that the calorific, the luminous, and the chemical rays are distinct the one from the other. And the term photography, which signifies taking pictures by light, is not absolutely correct, as I have said, and perhaps we shall see more clearly presently. It would have been more interesting if we could have had the real spectrum direct from the sun's rays in all its beauteous colours—viz., those of the rainbow, which is produced by the decomposition of white light, and to produce which there must be three things: a cloud for a back ground, falling rain, and a shining sun, each drop of rain forming a kind of prism, analyzing and refracting the solar ray. Rainbow! a token of the covenant that God made with Noah, that the earth should no more be destroyed by the waters of a flood. We are reminded of the goodness, and the faithfulness of the Creator, when we gaze with admiration on that beauteous sign. As, however, we cannot get the real spectrum from which to get the effect on prepared papers, I have obtained some pieces of coloured glass as near to the spectrum colours as possible. Here they are! Deep ruby, light ruby, deep orange, light orange, blue and green, and yellow. I take a piece of board, on it I place a long piece of gelatino chloride sensitized paper, lay these strips of glass side by side on the paper. I now expose these in the open, to bright sunshine, for any length of time, when so treated I fix, as it is called, these colours, and mount the paper on cardboard. Here are three cards, the paper having had different amounts of exposure to the sun. You will see that the actinic ray passing through the blue glass

darkens the paper considerably; the green comes next, not quite so dark; the violet next. This shows that actinism is confined to the upper part of the spectrum; for if you observe you will see that the lower part of the cards is quite white, because the actinic ray could not pass through the orange nor the ruby glasses. The luminous and other rays pass through easily, but the chemical ray is stopped. By this we learn that orange and ruby glass are the only ones that are suitable for glazing our developing rooms; they allow the luminous or light-giving ray to pass through the light we require, but the chemical ray that we do not want is strictly prohibited. Were it not for this circumstance, there could be no such thing as picture-making by what is denominated photography, or making pictures by light, which is not the case. Now, my dark room is perfectly light, so light that I can see to read small print in it; it is only dark in the chemical sense, whilst the luminous and other rays can enter, but actinism is excluded. I may expose a sensitized plate to that light for any length of time, and no effect will take place on it. How then can it be said that it is light that produces the change on the prepared plates or papers? No, it is not light, but something that is contained in a solar beam. If I were asked what name I would give to the art instead of photography, I would say actinography; but as the former title obtains, I suppose it will continue to do so until the end of the chapter, and we must be content with it.

Well, I think we have discovered the picture-producing agent, the question now is, what shall we do with it? Let us employ it as Daguerre and others did. Two centuries passed away from the time that Fabricus discovered that "luna-cornea," or chloride of silver, would blacken if exposed to the sun's rays, when, in 1777, Scheele, a chemist, found out that chloride of silver would blacken far more rapidly under the violet and blue rays than under any of the others, and Daguerre, by mere accident, made the important discovery that a plate of

silver, treated with vapour of iodine, was sensitive to the solar ray. The Daguerrotype process, published in 1839, is as follows:—A silver-plated sheet of copper, carefully cleaned and highly polished, was placed in a light, tight box, at an angle of 45°, and the vapour of iodine was made to impinge on the silvered plate which formed a surface of iodide of silver; this was very sensitive; but it was afterwards found that if this iodised plate were subsequently subjected to the vapour of bromine, forming a bromo-iodide of silver, its sensitiveness would be greatly increased. The plate thus treated, is ready for exposure in the camera to the object to be reproduced; the actinic ray being reflected from that object would operate on the sensitive plate. This now had to be exposed to the vapour of mercury, by which a very beautiful effect was produced. Here is a Daguerrotype portrait taken of myself more than fifty years ago, when I was a handsome young man! Pardon the vanity! There was, however, a difficulty in rendering these pictures permanent at first, for if, at this stage, they were exposed to open day, they would darken all over, so could only be viewed in a subdued light. It was necessary to remove the silver salts from the plate where the actinic ray had not acted, and this was done very imperfectly, until Sir John Herschel made known to the world the property of the hyposulphites of dissolving the salts of silver, which are insoluble in water.

The reign of Daguerrotype was a short one. There was this difficulty, pictures could not be multiplied. For every picture the whole process must be repeated. The copper-coated plate and all subsequent operations must be gone through for every portrait. About this time Mr. Fox Talbot, an Englishman, published a photographic process, by which, instead of using metallic plates, he utilized paper as a support for the image to be produced by the atinic ray. He dipped common writing paper in a solution of salt, dried it, then brushed it over with nitrate of silver. The salt in the paper uniting with the silver of the nitrate,

produced a surface of chloride of silver; this would have to be dried in a dark room. By placing this paper on an engraving, and allowing the light to pass through it on to the prepared paper, the picture would be reproduced. He greatly improved this process, so that he could use the paper in a camera, and so make a paper negative, from which he could print any number of positives.

We come now to a time at which a great improvement was made in the art called photographic (1851), the time at which I commenced business on my own account as a cement-maker, and it was not long after this that I took up this fascinating pastime. It is called the collodion process. The discovery was made by a Mr. Archer, who thought that a collodion surface on glass would be a good foundation for the silver salts. He was successful, and this collodion process has been adopted and used by professionals and amateurs for thirty years or more. It was also termed the wet process, but is now, to a very great extent, superseded by the dry process, which I shall have to refer to later on. By your permission I will describe the wet or collodion process, and that from personal experience. You ask what is collodion? It is an article used by surgeons to cover wounds, and to protect them from the air. It is named from the Greek word "kollaw," to stick; it is a glutinous transparent fluid, prepared by dissolving pyroxyline in a mixture of ether and alcohol. Now you are asking again, what is pyroxyline? Here is some in this little bottle; it is very old, for it is many years since I used any of it. Here are two bottles: one containing lignine or cotton-wool, the other contains pyroxyline. This cotton-wool is immersed in, and saturated with a mixture of sulphuric and nitric acids. After about ten minutes' soaking it is taken out, the excess of acid squeezed out, and it is then well washed in water. The chief use of the sulphuric acid is to concentrate the nitric; the former having a great affinity to water, takes up such as may be contained in the nitric. A simple experiment will prove this tendency, for if a glass of

sulphuric, about $\frac{3}{4}$ full, be exposed in a room, it will be found full and overflowing in a short time, having attracted to itself any moisture contained in the atmosphere. After immersion the cotton-wool is dried, and will be found to be increased in weight to the extent of one-half, and has become pyroxyline. The physical character of the cotton-wool has undergone a remarkable change, as you will see. I put on this tray a quantity of the wool, and burn it. It burns, it is true, but slowly, leaving behind a black mass of carbon. Now I put a similar quantity of the pyroxyline, and set light to it. Voila! there is an explosion, but what has become of it? there is not a particle of it left, as there was in the case of the wool, but the whole has been converted into gas, and has mingled with the surrounding air. Now this is pyroxyline, or a species of gun-cotton. This substance is now dissolved in a mixture of alcohol and ether, and then it is collodion. Some professionals and some amateurs did make it themselves, but as a rule it was bought, as it had become an important article of commerce, and the most celebrated maker was Mr. Mawson, of the firm of Mawson and Swan, of Newcastle-on-Tyne. At the time I was the Mayor of a northern borough, Mawson was the Sheriff, so I was intimately acquainted with him. He met with a sad end. Contrary to the bye-laws of the Corporation, there was a large quantity of nitro-glycerine stored in a warehouse; it was his business to seize and destroy it. Himself, the borough surveyor, and two police officers, took it in a cart on to the town moor with the intention of burying it. One of the men struck one of the kegs with a pickaxe, when the whole exploded, killing at once two of the men, but poor Mawson had the flesh torn off the whole of his face. He lingered at the hospital for a short time and expired. The stuff should have been taken in a vessel out into the North Sea, and deposited in deep water. Excuse this digression, but I thought it would be painfully interesting.

Well, we have got our collodion, what shall we do

with it? Let us cover a glass-plate; but the glass must be cleaned, and this means not simply mechanically cleaned, but chemically; it must be immersed in a solution of soda to remove any greasiness that may be on it, then well washed in water and immersed in dilute acid to get rid of the alkali; well washed again and dried with suitable glass cloths, and polished with wash-leather. Unless the glass is perfectly clean the collodion will not adhere. Much of this trouble was afterwards avoided as follows:—A gentleman in this town came to me in much perplexity, complaining that whilst washing his negatives under the tap the film slipped off, and so he lost his picture, however good it might have been. I said to him, Go home, take the white of one egg, beat it up perfectly, and put it into a quart of water, cover your plate with this dilute albumen, either as you cover it with collodion, or with a wide camel hair-brush, the film of albumen will very soon dry, and you can coat any number of plates in this way, and keep them ready to receive the collodion. He did so, and never lost a film afterwards by washing. When this plan is resorted to, the plates need not have so much cleaning. Now I coat a plate with collodion; this small plate I can hold by the corner; I make a little pool in the centre of the plate, gently tilt it to one corner the collodion flows to it, then to the left hand corner, then to the next, then to the fourth, and return it to the bottle. If it were a large plate I should use a pneumatic holder fixed in the centre of the plate. Holding this by the left hand and pouring the collodion on with the right, I have it under perfect control. I used to pride myself with the fact that I could cover a 12 × 10 plate, and return the surplus to the bottle without spilling a drop. This, of course, can only be acquired by practice. In a very short time the collodion is set; it must now be transferred to the nitrate of silver bath. Here is a dipping bath, and here is a glass dipper. I place the collodionised plate film outwards on the dipper and gently lower it into the bath for three minutes. I should

have said that the collodion should have a few drops of iodine in it, so that an iodide of silver would be found on the surface of the plate with excess of nitrate. This nitrate of silver bath must on no account be alkaline, or the resulting picture will be fogged or wanting in clearness and brilliancy. How does anyone know whether the bath is, or is not alkaline? That is very easy indeed. Here are two wine-glasses. One contains a solution of litmus, a vegetable blue (the liquor of red cabbage leaves will do as well); the other contains a tincture of turmeric. I take strips of paper. Here are some about ½ in. wide; I immerse about half the length of these papers; one into the blue glass, the other into the yellow. You see the papers have taken the colours of the liquids. When these papers are dry they form excellent tests for acids and alkalis. I have some here already dry. Here are two glasses; the liquid in one of them is acid, and that in the other is alkaline. I cannot tell which is which by simply looking at them. I take the blue paper, immerse it in one glass; no effect. I therefore know that it is not acid; but if I immerse it in the other glass, the blue paper is turned into a beautiful red colour. If I now put the yellow paper into the first glass it is turned brown. Now we know that acids have the property of turning vegetable blues red, and that alkalis have the power of turning turmeric paper brown. Keeping these papers in stock, we are always prepared to solve the problem.

The collodionized and sensitized plate must now, whilst still wet, be placed in the dark slide and exposed at once. After exposure it is treated with a developing solution, protosulphate of iron (15 grains), glacial acetic acid (30 minims) to each ounce of distilled water, by pouring this over the plate the picture is made visible; but should the negative thus produced be not sufficiently dense for printing purposes, it may be re-developed with pyrogallic acid, having a few-drops of nitrate of silver added. The plate must now be well washed under a tap, and treated with a strong

solution of cyanide of potassium; this will clear up the surface and permanently fix the image. A deal of washing is now necessary to remove all chemical matters from the plate, and when it is thoroughly dry it should be varnished in order to protect the film, after which any number of positives can be obtained from it. Here is some negative varnish; in practice it is usual to warm the plate; the only good it does is to secure thorough dryness of the surface. You see, I pour it on just in the same way as the collodion was applied—the varnish will be set in a very short time, when the alchohol in which the gums were dissolved shall have evaporated. I have described, so far, former processes, and it will be seen that they are not unattended with some difficulty, and, compared with the present state of the art, required much manual labour; for if we want to take some views at a distance from home, it is necessary to take with us, not only our camera and tripod, but we must have a dark tent, nitrate of silver bath, developing solutions, and other appliances, because the prepared plates must be exposed whilst they are wet. Thus a huge mass of luggage must be taken. Now many young men, some of whom I knew, began to follow this amusement, but for want of the necessary enthusiasm and indomitable perseverance soon gave it up entirely. I, however, having what some friends call Photography on the brain, have stuck to it through thick and thin. In order to obviate the difficulty of carrying so much impedimenta for getting distant views, I adopted the following method—that is, to cover the negatives after they came out of the nitrate of silver bath with dilute honey. This treatment had the effect of keeping the surface moist and preventing the nitrate from crystalling, and for twenty or thirty hours one might go forth with them and delelop on our return. It would be necessary to wash off the honey before development, or stains would be made on the plate. This plan, however, did not obtain. Here are some stereoscopic views taken in that way; one of them has a

stain upon it. Very different from these negatives and prints, that I made a quarter of a century ago. Observe these whole plate negatives. There is not a spot of any kind upon them, not a solitary pin-hole; they are as brilliant now as they were originally. The prints from them are the same. It shows that permanency can be secured if the matter is properly treated. That is, the negatives must be sufficiently treated with the clearing or fixing solution, then very thoroughly washed for hours to eliminate these solutions from the film. Now the prints: These also must be treated in the same manner as to fixing and washing as well as regards the toning. We must not be too sparing with the gold, which should pervade the whole surface of the print; but I must reserve remarks on printing and toning until I speak of present methods—viz., the dry process, which constitutes the great contrast between the present and the past.

PHOTOGRAPHY has now become one of the easiest and most fascinating pursuits imaginable. We have little or no impedmenta. Travellers have to take only their camera and tripod, together with some dry plates that require only a fraction of the exposure of wet plates. They may be away for months, and defer development until their return. The keeping quality of these plates is astonishing. That view on the wall, that I took on a 12×10 plate recently of the municipal technical school, was made on a plate that I had in stock move than six years. You can judge of the result. These plates are now an article of commerce, manufactured by the million by machinery, and are very cheap; quarter-plates not costing more than a shilling per dozen. I took, a short time ago, four dozen of these to Hastings, and exposed them all to land and sea views, in about eight days, and developed them on my return to Gravesend. A considerable number of prints from them may be seen in this album. These were taken as "snap-shots" with this hand camera in the $\frac{1}{70}$ of a second. If there is time I will explain the parts of it later

on. I have in this dark slide a half plate $6\frac{1}{2} \times 4\frac{3}{4}$. I should like to develop it in your presence, that you may see how wonderfully the developer reveals the latent image. There is nothing to be seen on the plate after exposure than there was before, yet the actinic ray has so operated on the silver salts contained in the film that the picture is there although not visible, and is only rendered so when the organic matter of the developer deposits the silver in the metallic state on the parts affected by the actinic ray. I now take a mixture of hydroquinone, sulphite of soda, and bromide of pottassium as one solution, and soda hydrate as another. Here they are in two glasses, an equal quantity in each. I will now mix them together. I will ask the Secretary to lower the gas. Thank you. Now, by the light of this ruby lamp, I will pour this solution on to the negative, which you see is film upwards in this developing dish. Whilst it is going on I will tell you that it is a view that I took in my studio a day or two ago for this lecture. It is a view of myself, in the act of taking myself. There! perhaps the mayor will kindly use his eyes on behalf of the meeting. See how the lines are appearing under the action of the developer. It is now sufficiently developed. I will just wash it in this vessel of water and immerse it in a solution of hyposulphite of soda, in order to remove the silver salts that do not constitute the picture. Turn up the gas, if you please. The negative may now be exposed to white light with impunity. How does the hyposulphite act on the negative? In this way. I have here two glasses. Into one I put some water, and dissolve in it a little common salt (chloride of sodium). In the other I have some dilute nitrate of silver. I mix the nitrate of silver solution with the salt water. See what a change has taken place. The glass is now half-full of a dense white mass of matter. Now that is the same kind of material that covers the negative plate, a substance that Fabricus called "horn silver," that would blacken if exposed to the sun's rays. It is chloride of silver. The chlorine of the chloride of

sodium, or salt, has gone over to the silver of the nitrate of silver forming chloride of silver, whilst the nitric acid of the nitrate of silver has gone to the soda of the salt forming nitrate of soda, and remains in solution. Now we will attend to this glass of white matter, and pour into it some of this hyposulphite of soda. (3 ounces to a pint of water). You see the effect. There is no longer an opaque mass, but a transparent fluid in the glass. This is a manifestation of the discovery of Sir John Herschel, that the hyposulphites have the property of dissolving silver salts, and this is what is accomplished when we immerse a negative in that solution—it dissolves out the unaffected chloride of silver on the plate.

I have not yet called your attention to the method of printing pictures from the negatives. I have in this printing frame a negative $4\frac{1}{4} \times 3\frac{1}{4}$, or what is called quarter-plate. It is a view of the Albert Memorial at Hastings, and was taken in the $\frac{1}{70}$ of a second. Behind it is a piece of "argento-gelatino-bromide" paper. I have also here a metronome, which is set to beat seconds exactly. I find it very useful when I am enlarging. Then I like to have my room, not only chemically, but absolutely dark, so that no light at all can come into the room otherwise than through the lens on to the easel. If time permit, I should like to explain the process of enlargement. I am now ready to expose this frame, and if this young lady will allow me to stand on her chair I will do so. I start the metronome, and hold this about twelve inches from the gas-burner during eight beats of the metronome. I will now ask the Secretary lower the gas, and by the side of the ruby lamp will develop the picture with "ferrous oxalate of potash." I have here two glasses—one containing twelve drams of oxalate of potash solution, and the other 2 drams of protosulphate of iron, both saturated solutions. I pour the iron solution into the oxalate solution, both nearly colourless. Now the mixed solutions have a nice red colour. It is quite necessary to observe this order of

mixing, for if I put the oxalate to the iron there would be a muddy, useless opaque mass. Here is a small dish containing water. I take out the paper that has been exposed to the gas-burner, and place it film side downwards in the water until the paper has become quite limp. I then turn it over film side upwards, pour off the water entirely, and pour on the ferrous oxalate. In a minute or two the image will appear. Yes, it is coming, as the mayor will please observe, and those also who are near. It is sufficiently developed and the Albert Tower is well defined. I will now rinse it in water, and immerse it face downwards in hyposulphite of soda solution for some minutes, after which it must be well washed, and it is then ready for mounting.

I will now call attention to printing by daylight. These are two principal kinds of paper—the albumenized and gelatino-chloride. The former is made by floating sheets of paper on albumen, white of eggs in a large quantity of water. This gives a glossy surface to the paper. When this paper is dry, it is floated for 3 minutes on a bath of nitrate of silver—sixty to eighty grains of nitrate of silver to each ounce of distilled water. This is now hung up in a dark place until it is dry, then put between sheets of blotting paper, and will keep good for a few days only; but is now ready to be printed on through the negative in open day. This had to be done formerly by professionals and by amateurs themselves, but now the sensitized papers are made in large quantities, and can be purchased of the dealers, thus saving time and trouble. The gelatino-chloride papers are also an article of commerce, and are rapidly superceding the albuminized paper.

You ask, How do you make that glossy appearance on the photographs? Nothing is easier. The paper is prepared with gelatine. I have a photograph here, printed but not glazed. Here is a dish of water. I place the print in the water for a minute or two to soften the gelatine. I

have also some pieces of compressed fibre with highly polished surfaces (polished plate-glass is usually employed). Now I take out the print, and carefully place it face downwards on the polished surface, cover it with a very thin piece of India-rubber cloth called jaconet, and pass this squegee over it, to squeeze all the water and air-bubbles from between the print and its support. When this is dry, it will come off readily with a beautiful gloss on the surface. In order to shew this, I produce a support, having on it a print. That was put on yesterday and still remains. This has been backed by having a sheet of thick writing paper pasted on the print whilst on the support but not yet dry. This gives a thickness to the picture, and renders subsequent mounting unnecessary in some cases. Perhaps the mayor will kindly take off the support. Just lift one corner with a penknife and the print comes off easily. There it is, you see, with a very high gloss upon it.

HAND CAMERA.—Here is one for taking what are called "snap-shots." In the front there is a round hole, inside of which is a suitable lens; there is a sliding shutter to cover it over when not in use. On the top is a little window called a finder. Now, when I hold this camera with the concealed lens pointing towards the object to be taken, I am looking down on this finder, and so soon as the object presents itself thereon I touch a spring, which causes a shutter, that at all other times covers the lens, to open and shut in $\frac{1}{100}$ or $\frac{1}{70}$ of a second, and that object is impressed on a prepared plate inside the box. If you look inside, you will see twelve metal sheaths, in each of which we put a prepared plate. The lower one is at a fixed distance from the lens so as to be in focus. When one plate has been exposed, I pull down this rod and push it back again, by which motion the first plate is removed and the next drops in its place ready to be exposed. Now, in order that one may know how many plates have been exposed, there is a little hole by the side that shews an indicator, presenting

the number to view; for the same operation that changes the plate also records the number exposed. At the bottom of the camera there are two levers. One to regulate the size of the opening through which the actinic ray has to pass, the other to regulate the time of exposure, which may be two seconds or the $\frac{1}{100}$ of a second. Of course, for moving objects, such as a ship in full sail, or a person on horseback, the quicker exposures must be used.

Now this camera, being charged with twelve plates, the whole thing weighing only a few pounds, one can carry about anywhere without fatigue. It is always ready, like a Colt's revolver, only, instead of four or six barrels, I have twelve;—or like the double-barrelled gun, with which the sportsman goes forth in search of game. So soon as he sees his bird, he presents his gun and fires. I do the same, only the effect in my case is much quicker; and he must recharge after two shots, I after twelve. There is no necessity now to encumber one's self with heavy apparatus to obtain large pictures, for, as I have said, these small ones can be enlarged to almost any size. There are some examples of that hanging on the walls in this room. A few weeks ago I went to Hastings, taking four dozen plates, and exposed them all in about eight days, and developed them on my return to Gravesend. I have also taken some at Southend, Naples, Rome, and Venice, and developed only after a long time.

I think, then, my audience will perceive that the contrast between the Photography of to-day and that of the past is so great and that the matter is now so simplified that any person in this room might, with a little attention, be able to take some very interesting pictures with a few weeks' practice. Is it not a very expensive amusement? I think not, as compared with many other kinds of amusement. When you have got your apparatus, it is only a matter of a few plates and some solution. These are now cheap enough. I said I would explain the method of enlarging; but having occupied your attention for two hours, I must

leave off although, I should like another hour. As this lecture is to be published not only in newspaper reports, but in a more extended form, I shall venture to write what I should have said, had time permitted.

ENLARGING:—I have on the north side of my dark room a hole in the wall outside of which is a looking-glass at an angle of 45°, just about the size of the frame in which the focusson glass is at the back of the camera. I take away this frame and substitute for it another, having an opening in it just the size of a quarter-plate. In this I fix a "snap-shot," or other negative, with the film side towards the lens. The camera is then placed close up to the hole in the wall, allowing no light to enter but that which passes through the negative and through the lens. I have also a vertical frame that can slide from and towards the lens. In this frame there is a board sliding horizontally in grooves. This board is covered with white paper, on which the different size papers that may be used from 15½ to 12½ and downward. This board is adjusted as to distance until the required size is sharply focussed upon it. It is then fixed so that it may not move out of focus—that is to say, the carrying frame is fixed, but the papered board is free to be drawn out after being focussed on. I find this more convenient than pinning the paper on to an easel. I can take it out, lay it down on a table, and fix the prepared paper on to it with ease and correctness between the lines on the focussing board. It can then be replaced in the grooves with the certainty of occupying the same place as it did when focussing. I have used a good deal of Morgan and Kidds' argento-gelatino, bromide paper, large sizes, which has to be developed after exposure with ferrous oxalate of potash in the same way as I described to you when I printed a ¼ plate by the gas light earlier in the evening. The time of exposure must be judged according to the thinness or density of the negative, varying from fifteen to thirty seconds. I have explained the value of a metronome. I like to have the room thoroughly dark, so

that I cannot see the time by my watch; but having started the metronome beating seconds I can hear, and when a sufficient number of beats has been made, I cap the lens and go on to develop. I have a series of frames of different sizes with glass bottoms. One of these is supplied with water. The exposed paper is placed in it, face or film side downwards, and allowed to soak whilst I mix the aforesaid developer. I then turn the paper film side uppermost, pour off the water, and hold the frame at an angle under the tap to wash off any air-bubbles that may have been formed on the surface. Now, with a firm hand, sweep the said developer over the paper, and move it about that the whole surface is covered, when in a minute or less the picture will begin to appear. So soon as it is sufficiently developed, pour away the developer and pour on to the print, still in the frame, a quantity of acetic acid solution—1½ dram of acetic acid to a pint or more of water. The object of this is to prevent any of the iron of the developer remaining in the pores of the paper. It has now to be well washed to get rid of the acid, and immersed in a dish of hyposulphite of soda—3 oz. to a pint of water—for about ¼ of an hour; afterwards to be washed for a few hours to effectually eliminate the hypo. After which hang up to dry, when it is ready for mounting. Those portraits on the wall were all produced in that manner. Printing and toning albumenized and gelatino-chloride prints, whether printed from time-exposed or instantaneous negatives, require cleanliness and care, as well as good materials. If we would get the best results in the toning department, we must not be too sparing with the gold chloride. I was a good deal troubled in this respect until I took to making it myself, as it cannot always be depended on as bought in the shops. I should like to explain the mode of preparing it, but it would too much extend this pamphlet. I would just say that Messrs. Anthony, of New York, asked me to supply an article for their "Annual Bulletin." I sent them one on the manufacture of chloride

of gold, which was published in their last issue, 1892, at pages 68 and 69, to which I beg to refer the reader.

The Mayor proposed, and the Rector (Mr. Haslam) seconded, a vote of thanks to the Lecturer. The latter proposed, and Mr. McCartney seconded, a vote of thanks to the Mayor for presiding, which concluded the evening's entertainment.

I. C. JOHNSON.

Mayfield House, Gravesend,
November 10, 1893.